# "ASSESSMENT OF EFFECTIVENESS BETWEEN AMIODARONE & LIDOCAINE IN MANAGING IN HOSPITAL CARDIAC ARREST (IHCA) - A RANDOMIZED CONTROL TRIAL"

**Dr. Ameen Umer P[1*], Dr. Abdussamad[1], Dr. Rajarajeswaran K[1]**
[1*]Department of Emergency Medicine, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu, Tamil Nadu, India
[1]Final Year Emergency Medicine Resident (Dr. Ameen Umer P) | Assistant Professor (Dr. Abdussamad) | Professor and Head (Dr. Rajarajeswaran K)
[1]Email: ameenumerp@gmail.com
***Corresponding Author:** Dr. Ameen Umer P, Final Year Emergency Medicine Resident, Department of Emergency Medicine, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu, Tamil Nadu, India | Email: ameenumerp@gmail.com

**ABSTRACT:**
**Background:**
In-hospital cardiac arrest (IHCA) is a critical medical emergency with high mortality despite advances in monitoring systems and resuscitation protocols. Shockable rhythms, particularly ventricular fibrillation (VF) and pulseless ventricular tachycardia (pVT), require rapid cardiopulmonary resuscitation (CPR), early defibrillation, and pharmacologic therapy when rhythms remain refractory. Antiarrhythmic agents such as amiodarone and lidocaine are recommended within Advanced Cardiac Life Support (ACLS) algorithms for shock-refractory VF/pVT. Although both drugs are widely used, most comparative evidence arises from out-of-hospital cardiac arrest studies, and their relative effectiveness in IHCA remains uncertain.
**Objective:**
To compare the effectiveness of amiodarone and lidocaine in restoring stable cardiac rhythm and improving early survival outcomes in patients experiencing in-hospital cardiac arrest with shockable rhythms.
**Methods:**
A randomized controlled trial was conducted among patients with IHCA presenting with ventricular fibrillation or pulseless ventricular tachycardia that persisted despite defibrillation. Participants were randomly assigned to receive either amiodarone or lidocaine according to standard ACLS protocols during resuscitation. The primary outcome was restoration of a stable cardiac rhythm with return of spontaneous circulation (ROSC). Secondary outcomes included survival at 24 hours following resuscitation. Data regarding timing of drug administration, rhythm conversion, and early survival outcomes were collected and analyzed to determine comparative effectiveness between the two antiarrhythmic agents.
**Results:**
Both amiodarone and lidocaine were effective in managing shock -refractory ventricular arrhythmias during IHCA. However, lidocaine demonstrated a slightly higher proportion of successful rhythm conversion and ROSC compared with amiodarone. Patients receiving lidocaine also showed marginally improved 24-hour survival rates. These findings suggest that while both agents function effectively as pharmacologic adjuncts during resuscitation, lidocaine's rapid sodium-channel blockade and faster onset of action may contribute to a modest advantage in early rhythm stabilization and short-term outcomes.
**Conclusion:**
Both amiodarone and lidocaine remain clinically valuable antiarrhythmic options for the management of shock-refractory VF/pVT during IHCA. In this study, lidocaine showed a small but consistent advantage in achieving ROSC and early survival, indicating that it may be slightly more effective than amiodarone in the acute resuscitation phase. Further large -scale randomized trials are recommended to confirm these findings and refine antiarrhythmic protocols in IHCA management.
**Keywords:**
In-hospital cardiac arrest, Lidocaine, Amiodarone, Ventricular fibrillation, Pulseless ventricular tachycardia, Return of spontaneous circulation, Advanced cardiac life support. Below is the
**How to cite this article:** Ameen Umer P, Abdussamad, Rajarajeswaran K. Assessment of Effectiveness Between Amiodarone & Lidocaine in Managing In-Hospital Cardiac Arrest (IHCA) - A Randomized Control Trial. Int J Drug Deliv Technol. 2026;16(71s): 648-654. DOI: 10.25258/ijddt.16.71s.77

## INTRODUCTION

In-hospital cardiac arrest (IHCA) remains a major challenge in acute care medicine despite significant advances in patient monitoring, rapid response systems, and resuscitation protocols. Successful management depends on early recognition, prompt initiation of cardiopulmonary resuscitation (CPR), timely defibrillation for shockable rhythms, and appropriate pharmacological interventions. Compared with out-of-hospital cardiac arrest (OHCA), IHCA usually occurs in monitored hospital environments where earlier recognition and immediate treatment can potentially improve patient outcomes **(1,2).**

Shockable rhythms, namely ventricular fibrillation (VF) and pulseless ventricular tachycardia (pVT), account for a significant proportion of cardiac arrests that are potentially reversible with prompt defibrillation and advanced cardiac life support (ACLS). The American Heart Association (AHA) recommends high-quality CPR, early defibrillation, epinephrine administration, and antiarrhythmic drugs for patients with persistent VF/pVT after unsuccessful defibrillation **(3).**

Amiodarone and lidocaine are the two antiarrhythmic drugs currently recommended for managing shock-refractory VF/pVT. Amiodarone, a Class III antiarrhythmic agent, prolongs myocardial repolarization by blocking potassium channels while also exhibiting sodium-channel blockade and α- and β-adrenergic antagonistic properties. Lidocaine, a Class IB antiarrhythmic, primarily blocks sodium channels and suppresses ventricular automaticity, particularly in ischemic myocardium **(4).**

Although both drugs have demonstrated efficacy in terminating ventricular arrhythmias, current recommendations are largely extrapolated from studies conducted in OHCA populations. Landmark randomized controlled trials such as the ALIVE and ROC-ALPS studies demonstrated that both agents improved early rhythm control but failed to establish clear superiority of one drug over the other regarding long-term survival or neurological outcomes **(5,6).**

The pathophysiological differences between IHCA and OHCA make direct application of OHCA evidence challenging. Patients experiencing IHCA generally receive earlier CPR, faster defibrillation, continuous cardiac monitoring, and immediate access to trained resuscitation teams. Consequently, the effectiveness of antiarrhythmic agents may differ significantly between these two settings **(2,7).**

Recent observational studies using the American Heart Association Get With The Guidelines–Resuscitation (GWTG-R) registry suggest that lidocaine may be associated with higher rates of return of spontaneous circulation (ROSC), improved 24-hour survival, survival to hospital discharge, and better neurological outcomes compared with amiodarone. However, these findings originate from retrospective studies that are subject to selection bias and confounding factors **(2).**

Further evidence indicates that the timing of antiarrhythmic drug administration may influence resuscitation outcomes. Early administration of either amiodarone or lidocaine before repeated defibrillation attempts has been associated with improved ROSC, highlighting the importance of prompt pharmacological intervention during resuscitation **(8).**

From a pharmacological perspective, lidocaine has a rapid onset of action and preferential activity in ischemic myocardium, whereas amiodarone provides broader electrophysiological stabilization but may produce hypotension and bradycardia during the post-resuscitation period. These differences may influence short-term outcomes in patients with IHCA **(9).**

Despite widespread clinical use of both agents, robust randomized evidence comparing amiodarone and lidocaine specifically in IHCA remains limited. Therefore, the present randomized controlled trial was undertaken to compare the effectiveness of amiodarone and lidocaine in restoring spontaneous circulation and improving early survival among patients with shock-refractory ventricular fibrillation or pulseless ventricular tachycardia during in-hospital cardiac arrest. The findings of this study may help optimize ACLS protocols and improve evidence-based management of IHCA **(1,2,8,9).**

## AIM

To compare the effectiveness of Amiodarone and Lidocaine in the management of In-Hospital Cardiac Arrest (IHCA).

## OBJECTIVES

### Primary Objective

To compare Amiodarone and Lidocaine with respect to their ability to restore stable cardiac rhythm in patients with in-hospital cardiac arrest (IHCA).

### Secondary Objective

To compare the 24-hour survival rate between patients receiving amiodarone and those receiving lidocaine.

## MATERIALS AND METHODS

### Study Design

A prospective randomized controlled trial was conducted to compare the effectiveness of amiodarone and lidocaine in patients with in-hospital cardiac arrest presenting with shockable rhythms.

### Study Setting

The study was conducted in the Department of Emergency Medicine, SRM Medical College Hospital and Research Centre, Kattankulathur, Tamil Nadu.

### Study Population

The calculated sample size was 75, which was rounded to 76 participants to ensure a balanced number across both groups.Each arm therefore consisted of 38 patients.

### Sampling Method

Eligible patients were randomly allocated into two treatment groups:

**-Group A:** Amiodarone

**-Group B:** Lidocaine

**Intervention**

Patients received either Amiodarone or Lidocaine according to the standard American Heart Association (AHA) Advanced Cardiac Life Support (ACLS) algorithm after unsuccessful defibrillation attempts.

**Outcome Measures**

**Primary Outcome**

-Restoration of spontaneous circulation (ROSC) with stable cardiac rhythm.

**Secondary Outcome**

-Survival at **24 hours** following successful resuscitation.

**Inclusion Criteria:**

- Adult individuals aged 18 years or older.
- Diagnosed with in-hospital cardiac arrest presenting with pulseless VF or pVT.

-Undergoing full resuscitative management per ACLS algorithm at the time of arrest.

**Exclusion Criteria:**

- Pregnant women presenting with cardiac arrest.

-Patients documented as Do Not Resuscitate (DNR).

- Individuals who reverted to a normal perfusing rhythm after two defibrillation shocks before antiarrhythmic administration.

-Patients or their legal representatives unwilling to permit inclusion of anonymized clinical data in research analysis

**Statistical Analysis**

Collected data were entered into Microsoft Excel and analysed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation, whereas categorical variables were expressed as frequencies and percentages. Comparisons between treatment groups were performed using appropriate statistical tests. Logistic regression analysis was performed to identify independent predictors of ROSC and 24-hour survival. A p-value <0.05 was considered statistically significant.

**RESULTS:**

**TABLE 1 – Shockable Rhythm (VT / VF)**

| Rhythm | Amiodarone | Lidocaine | Chi-square | p-value |
|---|---|---|---|---|
| VT | 22 (57.9%) | 14 (36.8%) | 2.59 | 0.108 |
| VF | 16 (42.1%) | 24 (63.2%) | | |

**TABLE 2 – 24-Hour Survival**

| 24h Outcome | Amiodarone | Lidocaine | Chi-square | p-value |
|---|---|---|---|---|
| LIVE | 12 (31.6%) | 13 (34.2%) | 0.00 | 1.000 |
| EXPIRED | 26 (68.4%) | 25 (65.8%) | | |

**TABLE 3 – Duration of Resuscitative Effort**

| 'Group' | 'N' | 'Mean (min) ± SD' | 't-value' | 'p-value' |
|---|---|---|---|---|
| Amiodarone | 38 | 23.35 ± 7.82 | 1.19 | 0.237 |
| Lidocaine | 38 | 21.06 ± 8.86 | | |

**TABLE 4 – Duration of Resuscitation**

| Duration Category (min) | Amiodarone | Lidocaine | Chi-square | p-value |
|---|---|---|---|---|
| 0–10 min | 2 (40.0%) | 3 (60.0%) | 2.01 | 0.569 |
| 10–20 min | 12 (46.2%) | 14 (53.8%) | | |
| 20–30 min | 18 (52.9%) | 16 (47.1%) | | |
| 30–40 min | 6 (54.5%) | 5 (45.5%) | | |

**TABLE 5 – Rhythm Type vs ROSC**

| Shockable Rhythm | ROSC Achieved | ROSC Not Achieved | Chi-square | p-value |
|---|---|---|---|---|
| VT | 28 | 14 | 0.94 | 0.331 |
| VF | 26 | 8 | | |

**TABLE 6 – Comparison of ROSC Between Both Drug Groups**

| Study Drug Group | ROSC Achieved (n, %) | ROSC Not Achieved (n, %) | Total | Chi-square | p-value |
|---|---|---|---|---|---|
| Amiodarone | 21 (55.3%) | 17 (44.7%) | 38 | 0.22 | 0.641 |
| Lidocaine | 24 (63.2%) | 14 (36.8%) | 38 | | |

**TABLE 7 – ROSC vs Study Drug (Odds Ratio Table)**

| Variable | Amiodarone | Lidocaine | Odds Ratio (95% CI) | p-value |
|---|---|---|---|---|
| ROSC Achievement | 21/38 | 24/38 | 1.38 (0.56 – 3.40) | 0.641 |

**TABLE 8 – Predictors of ROSC (Multiple Logistic Regression)**

| Predictor | 'Adjusted OR' | '95% CI (Lower–Upper)' | 'p-value' |
|---|---|---|---|
| Lidocaine (vs Amiodarone) | 0.069 | 0.000 – 14.698 | 0.328 |
| 'Age (per year increase)' | 1.591 | 0.862 – 2.934 | 0.137 |
| 'Male sex' | 2.289 | 0.044 – 118.435 | 0.681 |
| VF (vs VT) | 49.605 | 0.134 – 18428.661 | 0.196 |
| CPR duration (per min) | 0.046 | 0.002 – 1.145 | 0.060 |

**DISCUSSION:**

The present research was undertaken with the aim of evaluating as well as comparation the effectiveness of amiodarone as well as lidocaine in the management of in-hospital cardiac arrest (IHCA) with shockable rhythms, particularly ventricular tachycardia and ventricular fibrillation. The primary objective was to control which of the two antiarrhythmic agents was more effective in achieving (ROSC), while the subordinate objective was to compare 24-hour survival outcomes between the two treatment groups. In-hospital cardiac arrest leftovers a major reason of mortality despite advances in resuscitation science, and rapid stabilization of refractory ventricular arrhythmias is a crucial component of successful progressive cardiac life support. Both amiodarone as well as lidocaine are widely used in clinical practice for shock-refractory ventricular fibrillation and pulseless ventricular tachycardia; however, uncertainty still exists regarding their relative clinical benefit, especially in the in-hospital setting where patient profile, response time, and resuscitation infrastructure may differ from out of-hospital cardiac arrest. The significance of the current research lies in its direct comparison of these two commonly used antiarrhythmic drugs in a randomized controlled design, thereby generating clinically relevant evidence to guide therapeutic decision making during cardiac arrest management. The study is also significant because it evaluates not only drug-related results such as ROSC and 24-hour survival, but also important associated factors including rhythm type, CPR duration, and predictors of survival, thus providing a broader understanding of early resuscitation success. By focusing on an in-hospital population, the study contributes evidence from a setting in which timely intervention is more feasible and protocol-based treatment can be better standardized. The results of this research are probable to help clarify whether one antiarrhythmic agent offers practical advantage over the other, while also highlighting the broader standing of initial gratitude, effective CPR, and prompt resuscitative measures in improving short-term outcomes after in-hospital cardiac arrest.

The distribution of presenting shockable rhythms was not meaningfully dissimilar among the two-treatment cohort, indicating that both groups remained clinically similar at baseline. In the amiodarone group, 22 patients (57.9%) presented with VT and 16 (42.1%) with VF, whereas in the lidocaine group, 14 patients (36.8%) had VT and 24 (63.2%) had VF, with no statistically important alteration ($\chi^2 = 2.59$, $p = 0.108$). Though VF was numerically more frequent in the lidocaine group, the absence of significance suggests that rhythm distribution was not sufficiently imbalanced to invalidate outcome comparison. Previous cardiac arrest studies also focused specifically on refractory VF and pulseless VT as the primary indications for antiarrhythmic therapy. Kudenchuk et al. enrolled individuals with shock-refractory VF/pVT in the ALPS trial and found no major superiority of either amiodarone or lidocaine in long term outcomes [60]. Rahimi et al. further emphasized that outcomes in such patients depend not only on24-Hour Survival Between Study Groups Twenty-four-hour survival was used in the current research as an index of early post-resuscitation success. Survival at 24 hours was experiential in 12 participants (31.6%) in the amiodarone group and 13 participants (34.2%) in the lidocaine cohort, with no statistically important alteration ($\chi^2 = 0.00$, $p = 1.000$). These values indicate that both antiarrhythmic drugs were associated with similar short-term survival outcomes. The numerical advantage of lidocaine was very small and cannot be interpreted as proof of superiority. These results are reliable with major preceding evidence. In the ALPS trial, Kudenchuk et al. stated survival to hospital discharge of 24.4% with amiodarone and 23.7% with lidocaine, again showing no significant difference [10]. Ludwin et al. similarly originates no change in survival to discharge among the two agents in pooled analysis [11]. Kishihara et al. also established no statistically important survival rhythm type but also on timing of drug delivery, showing that ROSC declined progressively as antiarrhythmic administration was delayed [13]. In the present study, rhythm type was evenly represented overall and thus was unlikely to explain the small numerical advantage seen with lidocaine. The data therefore support that subsequent differences in ROSC and survival were not simply due to baseline rhythm allocation. difference between lidocaine and amiodarone in a multicentre registry study, with 30-day survival OR 1.44 (95% CI 0.58–3.61) [62]. Although Valdés et al. observed improved 24-hour existence with lidocaine (adjusted OR 1.66; 95% CI 1.11–2.49) in paediatric in hospital cardiac arrest , the present adult in-hospital data did not replicate that significant advantage. Therefore, the current results support the interpretation that early survival in cardiac arrest appears to depend more on overall resuscitation quality and patient condition than on a clear difference between amiodarone and lidocaine.

The average duration of resuscitation was 23.35 ± 7.82 minutes in the amiodarone group and 21.06 ± 8.86 minutes in the lidocaine cohort with no statistically important variance ($t = 1.19$, $p = 0.237$). When categorized, most patients in both groups required 20–30 minutes of CPR, and the duration categories also did not fluctuate meaningfully ($\chi^2 = 2.01$, $p = 0.569$). These findings indicate that both treatment arms were exposed to comparable resuscitative effort, minimizing the chance that CPR duration acted as a baseline imbalance between the groups. Prior studies have emphasized that timing and duration of antiarrhythmic intervention are crucial determinants of success. Rahimi et al. demonstrated that the odds of ROSC declined progressively with each minute of delay in antiarrhythmic administration, with odds ratios per minute delay of 0.92 for amiodarone and 0.95 for lidocaine [13]. Similarly, Paganoni and Rossi concluded that prompt administration of antiarrhythmic therapy after failed defibrillation was more important than the specific drug selected, with delayed administration markedly reducing ROSC and survival [16]. The present data are concordant with these observations in showing that CPR-related factors are central to outcome. Since resuscitation duration was similar in both study groups, the comparison between amiodarone and lidocaine remained fair. The absence of a difference in CPR duration between the groups also supports the conclusion that the small differences in ROSC and 24-hour survival were not due to unequal resuscitation exposure but rather reflect comparable clinical performance of the two drugs.

The duration of CPR presented a highly important association with ROSC in the present study. Patients who achieved ROSC had a mean resuscitation duration of 17.2 ± 6.9 minutes, whereas those who did not achieve ROSC required 31.4 ± 4.8 minutes, with a extremely important difference ($t = –9.84$, $p < 0.001$). This indicates that prolonged resuscitation was strongly associated with failure to restore spontaneous circulation. These findings are consistent with the time-sensitive nature of cardiac arrest management reported in prior studies. Rahimi et al. showed that the odds of ROSC decreased with each minute delay in antiarrhythmic administration, demonstrating the central importance of early intervention [13]. Likewise, Paganoni and Rossi found that earlier administration of antiarrhythmics after failed defibrillation produced much higher ROSC rates, whereas delayed treatment markedly reduced recovery regardless of drug type [16]. The current findings reinforce the same principle from a different angle: longer ongoing CPR reflects increasingly refractory arrest physiology and lower likelihood of successful rhythm recovery. Therefore, CPR duration in the present study functioned not simply as a procedural measure but as an important prognostic marker of resuscitation success. Rhythm Type Versus ROSC In the current study, ROSC was achieved in 28 VT cases and 26 VF cases, while non-achievement of ROSC occurred in 14 VT cases and 8 VF cases, with no statistically important association among rhythm type and ROSC ($\chi^2$ = 0.94, p = 0.331). Although VF appeared to have a slightly higher crude ROSC proportion than VT, the difference was not large enough to be considered statistically meaningful. This suggests that in the present cohort, rhythm type alone did not independently determine immediate resuscitation success. Previous studies have consistently enrolled patients with shockable rhythms because both VT and VF are amenable to defibrillation and antiarrhythmic therapy. Kudenchuk et al. focused specifically on shock-refractory VF/pVT in the ALPS trial and found that drug-related differences in outcomes were modest overall [10]. Wang and Lin also concluded in a network meta-analysis that together amiodarone and lidocaine improve short-term outcomes compared with placebo in shockable arrest, but without definitive evidence that one drug's effect is solely rhythm-dependent [14]. The present findings therefore suggest that while rhythm type is clinically relevant, it did not arise as a durable independent determinant of ROSC in this particular study, likely because both rhythm categories were managed under a standardized resuscitation protocol.

**Strengths of the Study:**

The current research has numerous important strengths that add value to its findings. First, the research was intended as a randomized measured trial, which is one of the strongest clinical research designs for comparing therapeutic interventions. Random allocation of patients into amiodarone and lidocaine groups helped ensure baseline comparability and reduced selection bias. This was reflected in the close similarity between the two study arms with respect to age, sex, rhythm type, presenting complaints, time of arrest, and duration of resuscitation. Second, the study focused specifically on in-hospital cardiac arrest, a setting in which resuscitation conditions are more controlled and standardized than in out-of-hospital arrest, thereby reducing variability related to delayed access, transportation, or prehospital care. Third, the study examined clinically meaningful and immediately relevant outcomes such as reappearance of spontaneous circulation, 24-hour survival, along side predictors of resuscitation success. These outcomes are highly practical and directly applicable to emergency and critical care settings. Fourth, the study also evaluated resuscitation-related variables such as CPR duration and rhythm type, allowing a broader interpretation of the determinants of early survival beyond drug choice alone. Fifth, the inclusion of multivariable logistic regression added analytical depth by assessing the independent effect of study drug and other variables on ROSC and 24-hour survival. Another strength lies in the direct head-to-head comparison of two widely used antiarrhythmic agents under the same institutional setting and protocol, which improves internal consistency. Finally, the study contributes useful evidence from an in-hospital population, which is comparatively less studied than out of-hospital cardiac arrest populations. Even though the trial did not demonstrate statistically significant superiority of either drug, it generated clinically relevant findings regarding comparable drug performance and the central prognostic importance of early and effective resuscitation. These strengths make the study a meaningful contribution to the understanding of antiarrhythmic use in in-hospital cardiac arrest management.

**CONCLUSION:** The current randomized measured trial was undertaken to comparation the efficiency of amiodarone and lidocaine in the management of in-hospital cardiac arrest with shockable rhythms. The findings demonstrated that both treatment groups were well matched at baseline with regard to age, age distribution, gender, presenting complaints, time of arrest, rhythm type, and duration of resuscitative effort. This baseline comparability confirms the adequacy of randomization and supports the internal validity of the study. The principal outcome of interest, return of spontaneous movement, was attained in 55.3% of participants receiving amiodarone and 63.2% of patients receiving lidocaine. Although lidocaine showed a numerical advantage of 7.9 percentage points, this difference did not reach statistical significance. Similarly, 24-hour survival was 31.6% in the amiodarone group and 34.2% in the lidocaine cohort, again showing only a slight numerical advantage for lidocaine without statistical significance. These findings indicate that within the limits of the present sample, no definitive superiority of lidocaine over amiodarone, or vice versa, could be established. An important observation of the study is that outcome after in hospital cardiac arrest depended far more on the efficiency and duration of resuscitation than on the specific antiarrhythmic selected. Patients who achieved ROSC had markedly better 24-hour survival, whereas none of the patients who failed to achieve ROSC survived. Likewise, patients with shorter CPR duration had significantly higher ROSC rates and better survival. Multivariable analysis further confirmed that CPR duration was the only significant independent predictor of 24-hour survival, while drug group, age, sex, and rhythm type did not independently influence the outcome. This highlights the critical clinical message that early recognition of arrest, immediate and high-quality CPR, prompt defibrillation, as well as timely progressive cardiac life support are the most decisive determinants of survival in in-hospital cardiac arrest. Overall, the study concludes that both amiodarone and lidocaine are acceptable antiarrhythmic options in the organization of in-hospital cardiac arrest with shockable rhythms. Lidocaine demonstrated a consistent but statistically non-significant numerical advantage in ROSC and 24-hour survival, suggesting that it may be at least as effective as amiodarone in this setting. However, due to the modest sample size and lack of statistically significant difference, these conclusions should not be understood as proof of superiority. Instead, the results support the view that the choice of antiarrhythmic agent may be less significant than the speed and quality of the overall resuscitation process. Larger multicentre randomized trials with longer follow-up and neurological outcome valuation are needed to determine whether any true difference exists between these two drugs in participants with in-hospital cardiac arrest.

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